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July 11, 1959

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# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Sky's Looking Glass

See Page 23

A SCIENCE SERVICE PUBLICATION

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## ASTROPHYSICS

# Propose Heavens Are Hot

A theory that the universe is "hot," which could explain such phenomena as the origin of cosmic rays and galaxies with a bright radio "halo," has been proposed.

THE HEAVENS are hot, not cold as has been supposed.

This theory has been proposed by Prof. Thomas Gold of Harvard University and Prof. Fred Hoyle of Cambridge University, England. Their idea of a "hot universe" complements the steady-state hypothesis for the origin of the universe they suggested, with Hermann Bondi of London, several years ago. According to the steady-state theory, matter is being formed continually, and the universe has always looked and always will look as it does now.

The hot universe theory explains some puzzles, such as the origin of cosmic rays, and of galaxies and the bright radio "halo" that surrounds them. The two astronomers discuss their theory in the "Paris Symposium on Radio Astronomy," published by Stanford University Press.

Galaxies are great scattered islands of billions of stars. The Milky Way in which the sun and its planets, including earth, are located is only one of millions of such giant groups of stars. Galaxies hurtle thousands of miles a second through space filled with a tenuous hydrogen gas. The hydrogen atoms of this gas in intergalactic space may have temperatures up to 100 million degrees, Profs. Hoyle and Gold suggest.

Their theory does not mean that an intergalactic space traveler who put his arm out the window would be burned; his arm would freeze. This is because the hydrogen atoms, although they have an average temperature of 100 million degrees as measured by their speed, occur only one or two in each cubic yard of space. The concentration of heat is, therefore, close to zero.

Although one or two atoms per cubic yard seems small, the universe is so large that the number of tons of hydrogen gas in space is close to the figure 10 followed by 48 zeros.

The hot universe theory explains how galaxies may be formed from the hot hydrogen gas in space. Compared with the energetic hydrogen atoms in intergalactic space, the star galaxies themselves are cold. As they speed through space, the star galaxies leave a cold pocket in their wake. The hot gas condenses around this cold pocket, on a scale of thousands of light years, and a galaxy is born.

In time, nuclear reactions will produce other chemical elements from the hydrogen starting material.

The radio halo detected around galaxies is produced by radio waves emitted by the gas. Hot hydrogen gas surrounding a colder galaxy would have sufficient energy to produce the observed radio emission, Profs. Hoyle and Gold believe.

In trying to explain the origin of cosmic

rays in the past, astronomers have tailored their theories to fit the main assumption that the universe between the galaxies is cold. Cosmic rays, therefore, could not arise in such energyless space, and the current view is that this radiation originates only within galaxies and is accelerated by magnetic fields.

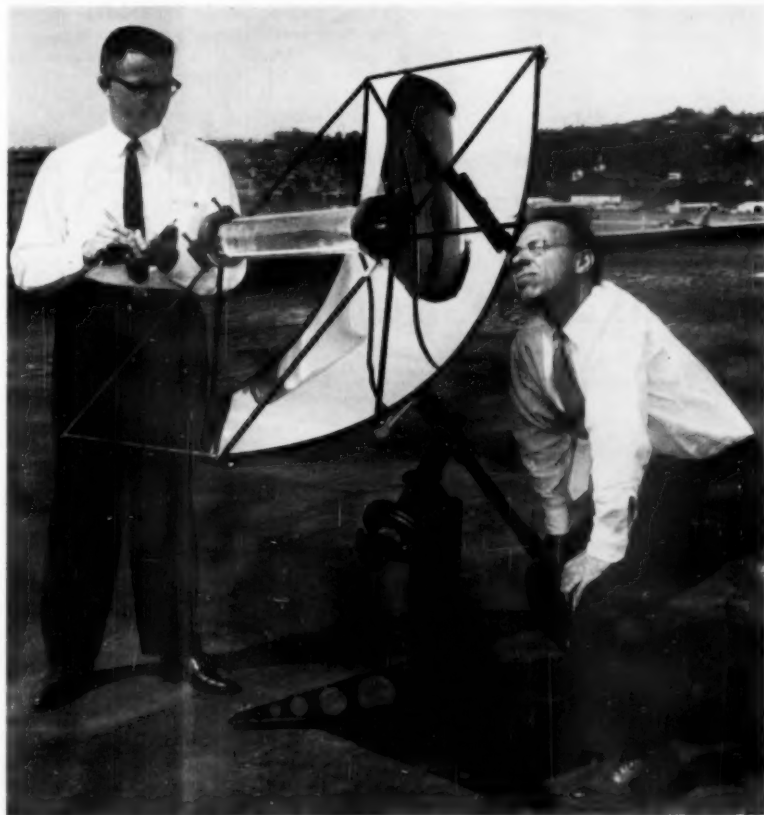
However, certain very energetic cosmic rays cannot be explained by this theory since the magnetic field strengths of galaxies are not high enough. In the hot universe

theory, cosmic rays could arise everywhere, and enough energy would exist in intergalactic regions for such energetic radiation to originate there.

While galaxies speed away from one another, in the space between them new galaxies arise. Thus the average density of these great "star islands" remains the same; the average age of the galaxies in one part of the sky would be about the same as the average in another region.

The hot universe provides a mechanism for the origin of these new galaxies. In addition, it argues against another view of the origin of the universe, which regards all matter now in space as once part of a huge "primeval atom" that exploded some five billion years ago and has been expanding ever since. If this were true, the hot universe could not exist since the expansion would have cooled the original material too greatly.

Science News Letter, July 11, 1959



**THERMOELECTRIC GENERATOR**—A solar-powered thermoelectric generator for tapping the energy of the sun is put through its paces on the roof of a Boeing Company building in Seattle. Developed jointly by Westinghouse engineer Niles F. Schub (left) and Boeing engineer Ralph Tallent (sighting through telescope at the sun), the generator can convert the energy of the sun into 2.5 watts of power—enough to power a radio transmitter far out in space. Boeing and Westinghouse said the generator may have application in long-mission satellites and manned space vehicles of the future. The concave, highly polished reflector, which resembles a "fun house" mirror, collects the sun's energy and concentrates it on a portion of the cylinder shaped generator in front of the reflector.

## GENETICS

# Genes Defy Tradition

GENES, tiny bits of heredity that make up the chromosomes, can be changed.

They do not always maintain their identity through thick and thin as scientists had once thought. The genes that do not act according to the rules have been found for the first time in corn plants.

Scientists had believed one of genetics' oldest laws was that genes retain their original properties even when combined with unlike partner genes or alleles. The gene that determines blue eyes in a human, for example, may not show up in the children of a blue-eyed woman if the father has brown eyes—which are dominant over blue. (It usually takes two genes to determine a characteristic.) However, the blue-eye gene is unaffected by its association with the brown-eye gene. When present in succeeding generations it will produce a blue-eyed person whenever there is no brown-eye gene present.

Now, a U.S. Department of Agriculture geneticist reports, a gene has been found that apparently is converted by its partner gene to "look like" the partner. This modified gene in turn can convert other alleles or genes, Dr. E. H. Coe Jr. said.

The "converter" gene and the partner

gene it affects control red color in the husks, stems and other parts of corn plants. With the normal gene, intense-red color is found. The converter gene determines weak-red color.

In his work, carried out at the Missouri Agricultural Experiment Station at Columbia, Mo., Dr. Coe crossed intense-red and weak-red corn plants. Only weak-red plants appeared in successive generations. The "old" genetic laws could not explain these results, Dr. Coe said.

Further experiments were made to learn if the cytoplasm was influencing color. The possibility that some irregularity in chromosome transmission might be affecting the intense-red color gene was also tested. Neither of these possible explanations was found to occur.

All tests have shown the gene for intense-red is permanently converted to weak-red. Earlier work by Prof. R. A. Brink of the University of Wisconsin has shown a similar permanent gene change with the gene for purple color in corn kernels.

Dr. Coe's research was supported by the National Science Foundation's genetic-biology program as well as by the USDA.

Science News Letter, July 11, 1959

## PHYSICS

# Atom Smasher Begun

THE ARGONNE NATIONAL Laboratory has started building at Lemont, Ill., a large atom smasher designed to learn more about the nature of nuclei.

Because the giant accelerator is being built using mostly known and tested methods, it is expected to do its assigned job without difficulty. It will speed proton "bullets" to energies of 12.5 billion electron volts before smashing them into target atoms.

However, many scientists have charged that the Argonne accelerator will be obsolete before it is finished, probably in 1962. By that time, the machines of 25 to 30 billion electron volts (Bev) now being built by Brookhaven National Laboratory on Long Island and at CERN, near Geneva, Switzerland, will be in operation. The Russians have reported plans for an accelerator designed to speed protons to 50 Bev.

The decision to build the Argonne accelerator was made several years ago at the very highest level within the Atomic Energy Commission, which supports the Argonne research center. At the time, the Russians were building their 10 Bev machine, a "souped-up" version of the University of California's Bevatron. Some scientists believe the main reason for deciding to build the 12.5 Bev Argonne proton synchrotron was to outdo the Russians.

Back of the go-ahead signal for constructing the Argonne machine was a long history of disagreement between two scientific groups, the scientists at Argonne and those

of MURA, the Midwestern Universities Research Association, organized by 15 Midwestern universities to promote research on high energy accelerators.

The MURA scientists are working on an improved model of a radically new kind of atom smasher, capable of producing effective energies of hundreds of billions of electron volts, far in excess of any other machines now planned. Scientists in this group are reported to be making slow progress now due to a lack of financial and moral support from the AEC.

The idea behind this super atom smasher is to hurl two atomic beams at each other, instead of a single beam crashing into a stationary target as in present machines. One suggested name for such a machine is "synchroclash."

Science News Letter, July 11, 1959

## ASTRONOMY

# Large Telescope Planned for Satellite

THE KITT PEAK National Observatory near Tucson, Ariz., will study the possibilities of putting a large telescope in an earth satellite.

Design work that could be used by engineers making such an instrument will be done under a grant of \$160,000 from the National Science Foundation.

Astronomers would like to put telescopes

above the earth's atmosphere to avoid distortion and absorption of light and radio waves from stellar objects. Being above the earth's atmosphere should allow telescopes on satellites to relay earthward observations of planets, stars and far-distant galaxies with unprecedented clarity. Such observations are expected to show details not seen from the earth's surface, even with the 200-inch telescope atop Mt. Palomar, Calif.

Preliminary engineering considerations indicate that the telescope might have a 50-inch aperture and a lifetime of five to ten years. The planning will be in cooperation with the National Aeronautics and Space Administration.

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## ROCKETRY

# Plasma Engine Developed

The plasma engine has been successfully laboratory tested with the harnessing of the shock wave generated by an electric current discharged through air in a cylinder.

A PLASMA ENGINE some day may power earthmen to Mars.

A laboratory triumph was described by Milton J. Minneman of Republic Aviation Corporation at the National Convention on Military Electronics meeting in Washington.

He disclosed that Republic scientists have been able at last to harness the brief, powerful shock wave generated when a strong electric current is discharged through air in a cylinder.

By using curved electrodes in the cylinder and by attaching a nozzle to its bottom end, the scientists were able to direct the shock wave to produce useful thrust. In experiments it blew a little disk into the air with a force of 4,000 pounds.

Results of this laboratory setup enabled the scientists to prove feasibility for a plasma engine for use in some future space ship.

They calculated that a 27,300-pound space vehicle, including a 5,000-pound instrumented payload, could make a one-way trip to Mars in "just over eight months," Mr. Minneman said, using a refined plasma engine.

The engine would give rapid bursts of low-level power over a long period. It could develop 9,000 pounds of thrust per pulse. But operating at pulse rate of 500 pulses per second, with each pulse lasting only 0.39-millionths of a second, an average thrust of only 1.8 pounds would be developed.

Although this may not seem much, Mr. Minneman commented, the engine is specifically designed to work outside the earth's gravity and its power would be adequate.

It could be used on a space ship that could be rocketed into space by other vehicles, or perhaps built there.

A statistic from the experiment that may interest rocket engineers is the plasma engine's "specific impulse" of 1,700 seconds. This is the rocket engineer's equivalent of "miles-per-gallon." A specific impulse of 1,700 seconds means that one pound of thrust is delivered for each pound of fuel over an operating period of 1,700 seconds. Specific impulse of the old V-2 rocket was 200 seconds; chemical rockets with specific impulses of 400 seconds are theoretically possible. Mr. Minneman said plasma engines probably could be designed to have specific impulses of 5,000 seconds.

Even "pinball machines" have troubles in successfully launching and recovering satellites.

During the Military Electronics convention, one of 78 exhibits shown resembled a huge pinball machine. Under glass it contained the earth and, at some distance, the moon.

A "player" jiggled switches to "fuel up" and make other pre-launch preparations, then pressed a button to blast off a satellite to the moon. The machine buzzed but nothing happened.

The attendant beat on the machine, but the satellite, a little ball, apparently had not been recovered from its previous shot. It appeared to be lost somewhere in the dark mechanical reaches of its own universe.

Science News Letter, July 11, 1959

## PUBLIC HEALTH

## 1,903 Water Supplies Naturally Fluoridated

WATER SUPPLIES of 1,903 cities and towns in the United States contain enough fluoride naturally to prevent two out of three dental cavities.

The combined population of these cities

and towns, about 7,000,000, added to about 35,000,000 people living in 1,800 communities practicing controlled fluoridation, indicates that one of every three people in the country using central water supplies now drinks fluoridated water.

These figures were contained in a report published by the U. S. Public Health Service based on data compiled by the dental directors of all state health agencies.

The 1,903 communities with naturally occurring fluoride are distributed throughout 43 states. The community populations range from less than 50 to more than 500,000, with 35% having more than 50,000 inhabitants. Thirty-eight percent have populations from 5,000 to 50,000, and 27% have less than 1,000 inhabitants.

Texas, the state with the most natural fluoridation, has 2,700,000 persons in 356 towns using naturally fluoridated water. New Mexico has 465,000 people, or 68% of the total population, living in communities with naturally fluoridated water.

Each of 12 other states—Illinois, Iowa, California, Colorado, Florida, Idaho, Indiana, Kansas, Louisiana, Michigan, Ohio and Wisconsin—has at least 100,000 people served by water with natural fluoridation.

The fluoride found naturally is identical in its dental effect to the fluoride used in controlled fluoridation, the PHS reported.

Science News Letter, July 11, 1959



**SATELLITE SPOTTER**—Barrel-like unit with "eye" (at right) is an infrared scanner and detector developed under an Air Force research program to explore the possibilities of detecting and tracking satellites by infrared techniques. Developed by the Avion division of ACF Industries, the unit scans a 40-by-90-degree segment of the sky every three seconds in its search for infrared emissions from orbiting satellites. Indication of detection would appear as a blip on scope, being adjusted in the photograph by Avion technician. The unit, known as CODES (Commutating Detection System), is said to be more than five times as sensitive as other infrared detectors for its weight, power, cost and simplicity. It was demonstrated at the Military Electronics National Convention in Washington.

## ASTRONOMY

# Discuss Origin of Universe

**Astronomers polled in a Science Service Grand Jury disagree on theories explaining the origin of the universe, as well as on the observations needed to answer the problem.**

THE WORLD'S top astronomers do not agree on the origin of the universe.

Of 33 participating in a SCIENCE SERVICE Grand Jury on this subject, there was a virtually equal division on whether or not the universe started with a "big bang" several billion years ago. To this question, 11 (33.3%) voted "Yes," and 12 (36.4%) voted "No," while 10 (30.3%) were counted as "Not Voting."

Concerning the more recent theory that matter is being continually created and destroyed, opinion was more sharply divided among the 33. More than half of those responding, 18, or 54.5%, said they did not agree. Eight, or 24.2%, replied they did believe matter is being continually created, and seven, or 21.2%, did not vote.

Of the 33 experts, 23, or 69.7%, showed high hopes that one or the other of these opposing theories would be proved right within the next 41 years, while three, or 9.1%, thought they would never be solved. Seven, or 21.2%, did not vote.

Concerning a specific year in the future voted on by 23, fourteen, or 42.5%, were sufficiently optimistic to predict that either the big bang or the steady-state question would be solved by 1975, the other nine, or 27.2%, holding out for the year 2000 A.D. One wrote in a forecast for a solution within five years, as well as voting for 1975.

Concerning the kind of observation most likely to give the answer to the problem, many of the astronomers and cosmologists responding to the poll chose more than one method. Twenty, or 60.5%, said observa-

tions of radio waves from far-distant objects would yield the answer, while three, or 9.1%, predicted that radio astronomy would not provide a solution.

A telescope on a satellite would do the job in the opinion of 11, or 33.3%, although seven, or 21.2%, held that it would not. An earthbound telescope, either the 200-inch giant atop Mt. Palomar or others of more than a 100-inch aperture, would give an answer to the origin of the universe, 10 of the 33, or 30.3%, believe. The lone astronomer who thought a telescope mounted from a balloon held the key was voted down ten to one by his colleagues.

Five astronomers, or 15.2%, did not vote on the question of what kind of observation would be most likely to provide a solution to the problem.

Of the 61 scientists selected for the Grand Jury, 36 came from the United States, two from Canada and 23 from foreign countries. Of those answering, 26 are U. S. scientists, two Canadian and five from foreign countries.

Besides answering questions, the 33 astronomers polled were given an opportunity to make any comment they desired, with assurances of anonymity for their remarks. Not all astronomers agreed with the idea of a poll.

One said, "I do not believe that polls such as this one serve any useful scientific purpose and in fact are apt to be misleading. I prefer, therefore, not to participate."

Another astronomer said that much of the "fun of astronomical research" would

be removed if a sure answer to the question of the origin were ever found.

One German astronomer remarked: "Of course, these answers are quite tentative and new observations—as everywhere in science—may completely overthrow some day our present ideas about the origin of the world 'as a whole.' More important than any specific answer is the fact that these problems have become accessible to scientific methods and scientific judgment."

A Netherlands astronomer said he thought the chief merit of the theory of continuous creation is "to force the cosmologists to realize the brittleness of all their inferences from observation."

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## PSYCHIATRY

## Tranquilizers and Alcohol Do Not Mix

PERSONS WHO take the tranquilizing drug chlorpromazine should not take even a small drink of alcoholic liquor and then drive a car or operate complex machinery.

In combination with chlorpromazine, a single drink, two ounces of 100-proof liquor, significantly impairs coordination and judgment and makes the driver "most unsafe," Drs. George A. Zirkle, Ott B. McAtee and Peter D. King of Madison State Hospital, Madison, Ind., warned the American Psychiatric Association meeting in Philadelphia.

Chlorpromazine is one of the tranquilizers prescribed not only for emotional upsets or tensions but for a variety of conditions including headaches and nausea.

As compared with persons taking either the tranquilizer or the alcohol alone, twice as many of those taking both felt sleepy and "groggy." The impairment was significantly greater on tasks requiring higher intellectual ability.

Physicians who prescribe chlorpromazine should warn their patients of the possible danger of using alcohol.

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## INDEX

### Addendum

Missing from the Science News Letter index for the six months, January through June 1959, which appeared in the June 27 issue, are entries for the June 13 issue.

At the left you will find listed in alphabetical order the missing index entries. To complete the published index for the first half of 1959 you may wish to clip these entries and add them to the appropriate columns. In some cases it will only be necessary to add another page number to an already existing entry.

## MEDICINE

# Debate Polio Virus Vaccine

THE LIVE VIRUS POLIO vaccine may soon make its debut.

Scientists have met to consider endorsing it for general use.

Behind whatever decision is reached by a National Foundation Committee will be the mass of information gathered at the World Health Organization's conference on live polio virus vaccine. (See SNL, June 27, p. 405; July 4, p. 3.)

The National Foundation brought together, in New York, the committee that recommended the field trial of the Salk vaccine. The committee was asked to determine whether or not the live virus vaccine should be recommended for general use.

The vaccine upon which the committee is expected to express an opinion was developed by Dr. Albert B. Sabin of the University of Cincinnati.

Dr. Sabin and the developers of two other strains of the vaccine, Dr. Herald Cox of Lederle Laboratories, Pearl River, N.Y., and Dr. Hilary Koprowski of Philadelphia's Wistar Institute, pooled information with leading experts from other countries using these strains. The meeting was called by the Pan American Sanitary Bureau and the World Health Organization. Evidence presented at the conference revealed that:

Mass vaccination with live virus vaccine on 2,250,000 persons in Russia went smoothly and safely. This was the summary of the report presented by Dr. M. P. Chumakov of the Academy of Medical Sciences, Moscow.

Use of the vaccine in Poland, Czechoslovakia, the Belgian Congo, Finland, the Netherlands, and in South American and North American countries, although on a smaller scale than the Russian program, resulted in protection against all three types of paralytic polio for those vaccinated.

Small scale trials in the U.S. revealed that the Cox strain, a single dose in cherry-flavored syrup, protected pregnant women from all three types of polio. The vaccine, taken by 139 pregnant women, the most susceptible to the disease, created safe antibody levels in 96.5% of the volunteers.

Another U.S. trial involving 550 showed that all three types of virus could be combined into one dose and still effectively produce polio fighters in the blood. It has been feared that the three types would interfere with each other's growth in the intestinal tract when fed in a mixture. Blood sample checks of 241 of the 550 persons indicates that the trivalent vaccine is 93% effective, Dr. Cox said.

Not all of the papers presented were glowing reports of the effectiveness of the vaccine, however. Dr. G. W. A. Dick, Queen's University, Belfast, Ireland, raised several questions to dampen the spirits of the researchers.

For instance, it is known that the live virus spreads from the vaccinated to persons in the immediate area. Whether or

not the virus, on its route from person to person, can revert to an active, crippling virus is not yet known. There have, so far, been no reports of such a case. On the other hand, there has been no proof that this does not or cannot happen, Dr. Dick emphasized.

He asked the three developers to suggest methods by which trials could be conducted to test every questionable aspect of the vaccine.

The United States Public Health Service is not entirely "sold" on the vaccine, either. Tests to date reveal that the vaccine is capable of producing paralytic polio in monkeys when injected into their spinal cords, Dr. Roderick Murray of the National Institutes of Health, Bethesda, Md., warned enthusiastic colleagues.

"We have a multitude of evidence to study now," Dr. Murray said. "The fact that it (the vaccine) causes paralysis in monkeys, which is one of our best tests of the vaccine's virulence, places it in a questionable position."

Even if the National Foundation backs the live virus vaccine for general use, it cannot be used in the United States until the Public Health Service grants a license to manufacturers. The PHS will not approve manufacture unless every questionable aspect of the vaccine is settled to its satisfaction.

Many scientists prefer the live virus vaccine to the Salk vaccine that contains killed virus because:

1. It produces longer immunity, possibly for a lifetime whereas the Salk vaccine protects for only several years.

2. The live virus vaccine can easily be given to adults and children—they simply swallow it.

3. It kills any polio infection in a person, preventing him from becoming a carrier of the disease to the unvaccinated.

4. The three types of polio virus can successfully be combined into one effective dose.

Meanwhile, as the number of paralyzing polio cases continues to climb this summer, the PHS has urged everyone to take advantage of the now available Salk shots.

Science News Letter, July 11, 1959

## ASTRONOMY

## Big "Eye" to Watch Stars Late This Summer

### See Front Cover

THE WORLD'S second largest telescope should be looking more than a billion light years into space before the end of summer.

The mirror of the 120-inch "eye" at the University of California's Lick Observatory at Mt. Hamilton, Calif., is being coated with aluminum only two-millionths of an inch thick, equal to one-tenth of a wavelength of green light. After testing of the coated surface and installation of instruments, the telescope will start scanning the heavens.

It will explore much of the same region of space now within reach only of the 200-inch Mt. Palomar giant. By tackling problems different from those studied at Palomar, it is expected that the telescope will accelerate the pace of knowledge-gathering and understanding of the universe.

The telescope will be devoted at first primarily to studies of stellar evolution, especially through the observation of young stars, and to studies of faraway galaxies, the universes beyond the Milky Way that dot the depths of space.

The telescope project was started in 1947, and has been financed by appropriations amounting to some \$2,500,000 from the California legislature.

Dr. A. E. Whitford, director of Lick Observatory, said that the aluminizing step means the astronomers and opticians are finally satisfied with the optical qualities of the mirror. Grinding of the mirror started in 1953, and during the process some 900 pounds were removed from the four-ton mirror blank.

The painstaking job of giving the mirror an optical surface with an accuracy to at least five millionths of an inch, was supervised by Donald O. Hendrix, Mt. Wilson and Palomar Observatories, who did the final correction of the 200-inch mirror at Palomar.

The photograph on the cover of this week's SCIENCE NEWS LETTER shows Mr. Hendrix, now temporarily on leave to Lick Observatory, using a hand polisher on the mirror surface. The circle-and-triangle pattern is the ribbed back structure of the glass disc which will later be covered.

Science News Letter, July 11, 1959



**VIRUS MAKING**—Dr. George W. Sharpless of the Lederle Laboratories withdraws 1 cc. of weakened "seed" virus, later adding it to a special bottle containing monkey kidney cells. This is part of the live polio virus vaccine manufacture.

## NUTRITION

**Protein Quality Equally Important Over Age 50**

QUANTITY of proteins is one thing—quality is another.

And while the diets of most Americans more than 50 years old usually contain a sufficient amount of protein, the quality may not always be adequate.

This may pose a serious and little-recognized nutritional problem, according to Dr. Stewart G. Tuttle, Dr. Marian E. Swendsen, Dorothy Mulcare, Dr. Wendell H. Griffith and Dr. Samuel H. Bassett of the University of California Medical Center and the Veterans Administration Center.

An early experiment indicated that males over 50 have a higher requirement for essential amino acids (protein constituents) than young adults. Further studies have suggested that increased intake of proteins of low biologic value (those deficient in certain essential amino acids) may even increase this requirement in those over 50, or in other words cause a nutritional imbalance.

The investigators point out that the self-selected food of elderly persons has frequently been found to be deficient in proteins of high biologic value. So amino acid deficiencies may indeed occur among these individuals.

In biologic protein values nutritionists generally rate eggs at 100%, meat slightly lower. Vegetables, cereals, breads and the like rate much lower down the scale.

It has been suggested that long term amino acid deficiencies occurring over the years after 50 may be related to degenerative processes. The UCLA-VA Center research team is investigating the possibility of such a relationship.

Science News Letter, July 11, 1959

## MEDICINE

**Memories Relived By Brain Stimulation**

J.T. CRIED out in astonishment: "Yes doctor, yes doctor! Now I hear people laughing—my friends in South Africa!"

Why was J.T. astonished? He was wide awake on an operating table in a Montreal hospital.

Under local anesthesia, with his skull laid open for brain surgery, he had become one of a series of subjects for a brief, harmless and fascinating digression. The doctor had, with gentle electrical impulses, stimulated part of his cerebral cortex. The memory and interpretive or emotional responses elicited by the stimulations to J.T. and other subjects (all brain surgery patients) are helping scientists map the human brain.

As reviewed in *Science* (June 26) by Dr. Wilder Penfield, director of the Montreal Neurological Institute, McGill University, certain areas of the temporal lobes can be artificially stimulated to bring forth whole memory sequences.

"It is as though a wire recorder . . . had been set in motion within the brain," he said. "The sights and sounds, and the

thoughts, of a former day pass through the man's mind again."

In stimulating the same general areas, Dr. Penfield has also found that sometimes emotions rise to consciousness. The patient may suddenly feel afraid, as though possessed by some nameless, formless dread or panic. Another patient may feel lonely and aloof, and seem to be observing himself from a distance.

It is conceivable, he hypothesized, that the recall and interpretive (emotional and otherwise) mechanisms may be part of a single mechanism in the brain.

The ability of the brain, stimulated by some present experience, to scan itself and bring forth memory and interpretive responses is a remarkable characteristic of humans. A full understanding depends on future experiments.

Science News Letter, July 11, 1959

## ROCKETS AND MISSILES

**Society Calls for End To Amateur Rocketry**

THE AMERICAN ROCKET SOCIETY has called for an end to rocket experimentation by amateur rocketeers.

It has taken this stand largely on the claim that the accident rate among non-professional rocket enthusiasts is proportionately higher than among the nation's motorists.

Of an estimated 10,000 persons engaged in amateur rocket experiments during a six-week period, the Society said, 162 rocket-incurred injuries were inflicted.

In a similar period, 140,000 motorists were injured in automobile accidents. Based on the 1950 population of 150,700,000 and 48,600,000 registered automobile drivers, this indicated a motorist accident rate of 22 per 10,000, far less than the rocket accident rate of 162 for 10,000 persons.

In a 76-page booklet, the Society directed its 46 member sections and 35 student chapters that "all practical means must be taken to prevent the manufacture of propellants of rockets by amateurs." It also said the launching of rockets by amateurs must be prohibited.

"The somewhat debatable loss in opportunity for intellectual development which might be suffered by foregoing experimentation is small compared with apparently unavoidable and appalling losses of eyes, fingers and lives," Col. John P. Stapp, ARS president, said.

The ARS program for eliminating accidents and deaths from live rocket experiments is centered in a request to chemical suppliers to refuse to sell certain hazardous chemicals to minors or organizations that have no license, liability insurance or permit.

This effort will be backed up by an education campaign to key sections of the public to gain their support of necessary laws and programs. In addition, the Society will prepare a 16-page brochure for widespread dissemination among amateur rocketeers and their parents and teachers, acquainting them with the dangers in attempting to build and fire home-made rockets.

Science News Letter, July 11, 1959

**IN SCIENCE**

## HERPETOLOGY

**Rattlesnake Disproves Snake Age Theory**

THE NUMBER OF RATTLES a rattlesnake shakes are no indication of how old he is.

For more than 14 years, Prof. Howard Evans of Cornell University has been observing a pet rattlesnake. In all that time, he said, the number of rattles has shown no relationship to the snake's age.

The five-foot long, two-inch thick Texas diamondback is 15 years old this month, close to the record of 22 for a rattler in captivity.

Prof. Evans is attempting to keep a record of the number of teeth the snake sheds each year for the rest of its life. Observations so far indicate fangs are lost at least once a month.

Normally, the snake is inactive, Prof. Evans said. In the spring, its mating time, and in the fall, the time it searches for a den, the snake is more active. Apparently the reptile can distinguish seasons by differences in the sun's light. Many animals can interpret the polarization of light as it changes with the seasons, Prof. Evans believes.

Science News Letter, July 11, 1959

## PUBLIC HEALTH

**Paralytic Polio Climbs At Rate of Early 1957**

THIS COUNTRY is experiencing more paralytic polio than it did last year, the chief of the poliomyelitis surveillance unit of the U. S. Public Health Service reported.

The latest figures for paralytic polio during 1959 follow more closely the higher figures of the first six months of 1957 than those of 1958, Dr. Harold Wylie at the Communicable Disease Center in Atlanta, Ga., told *SCIENCE SERVICE*.

Whether or not the polio outbreak will claim more victims this season than it did last year will depend primarily on how many epidemics occur in large cities.

Already this year 20 cases of polio have been reported to the P.H.S. from Des Moines, Iowa. Fourteen of these cases were paralytic, two resulted in death and the remainder were nonparalytic, he said. Small outbreaks have also been reported in Miami, Fla., and in Texas. There appears to be a rising trend in Virginia and other states.

Currently, some 40,000,000 Americans under the age of 40 are still without the three recommended polio vaccine shots. There are areas in the U. S. where no one has had any of the inoculations, Dr. Wylie explained. Finding these areas and getting the vaccine to the people of these areas is crucial to the eradication of polio.

Science News Letter, July 11, 1959



## CE FIELDS

### TECHNOLOGY

## Coatings on Wires Have Insulation Value

FLUORIDE COATINGS have been formed on copper, aluminum and other metal wires to provide exceptionally high insulation value at elevated temperatures, while still retaining flexibility and freedom from porosity.

This new insulation development could provide the answer to some of the problems in missile re-entry guidance systems, as well as in other high-temperature electrical applications. Presently, many potentially important applications of electrical circuitry at high temperatures are hindered by the lack of high-quality flexible wire insulation.

Developed by Bell Telephone Laboratories, New York, the insulating coatings are formed directly on freshly cleaned copper or aluminum by exposing them to oxidizing carriers of fluorine such as hydrogen fluoride or elemental fluorine at temperatures from 300 to 600 degrees centigrade.

The thickness of the resulting copper fluoride and aluminum fluoride films depends on the temperature at which they are formed, the concentration of fluorine and the time of exposure.

Electrical insulation values are very high for both copper and aluminum films, and both films retain their excellent insulating properties at high temperatures.

Aluminum fluoride films show good resistance to oxidation even above 600 degrees centigrade, and show no tendency to hydrate or dissolve on exposure to high humidity.

Fluoride coatings should be satisfactory almost up to the melting point of the conductor, whereas the best organic insulating coatings cannot be used continuously above 300 degrees centigrade. Although some inorganic insulators may be used as high as 830 degrees centigrade, they are generally porous and non-flexible.

Science News Letter, July 11, 1959

### OCEANOGRAPHY

## Miniature Sound Buoys To Aid in Ocean Study

A MINIATURE buoy containing a tiny radio transmitter and a hydrophone to permit rapid study of the ocean from an airplane is being developed. It offers a fast way to study marine life, ocean depth, and contour of the ocean floor.

J. J. Coop, of the U. S. Naval Air Development Center, Johnsville, Pa., told the Acoustical Society of America meeting in Ottawa, Canada, that by use of transistors and subminiature components, the so-called sonobuoy could be made so small that one

plane could carry several hundred. This would enable underwater sound measurements to be made over thousands of miles of ocean on a single flight.

If small explosive charges were dropped near the sonobuoys, the depth of the ocean could be determined by measuring the time required for the sound to travel to the ocean bottom and back to the buoy. The hydrophone, or sensitive underwater microphone, would pick up the sounds in the water, and the radio would transmit them to the aircraft.

Various sound conditions, such as sea noise, marine biological noise and thermal sound barrier effect, differ widely in various ocean areas. With the sonobuoy, scientists could record these varying effects over vast areas of ocean.

The acoustic nature of the ocean bottom can also be determined by measuring the intensity of the bottom-reflected sound.

Science News Letter, July 11, 1959

### MEDICINE

## Glue Treatment Means Fast Fracture Repair

A SPLASH of glue, three days setting time, and you can walk out of the hospital on a fractured leg.

The bone glue that makes this rapid recovery possible is being tried out at medical schools and hospitals throughout the United States and Canada.

The broken bones of about 250 trial patients have been glued together in the past three years. Had these people undergone conventional treatment for fractures, they might have spent as long as six months in plaster casts, either bedridden or stumbling along on crutches.

Tougher than bone itself, the glue is a plastic polyurethane foam that becomes rigid as it dries.

For surgical use, the glue is provided in a sterile kit containing two jars of yellowish viscous fluids and a wire beater. The fluids, a polyurethane and a catalyst, are mixed and beaten, and the fast-drying foam is formed.

It was developed by Dr. Michael P. Mandarino, Hahnemann Medical College and Hospital of Philadelphia, in cooperation with the Wm. S. Merrell Company, Cincinnati, Ohio, a drug firm.

Surgical gluing techniques are still under development. But, in general this is how a fracture is treated with the glue:

The bone is exposed and little plugs of bone are removed from each of the broken ends. Plastic foam is poured on the ends. The plugs are replaced in such a way that the two ends of the bone dovetail. After a few hours of immobility, while the glue stiffens, the repaired limb can be moved.

Dr. Mandarino, an orthopedic surgeon, said normal bone eventually grows through the glue and in about a year the ends join. During this time, the glue is absorbed and completely disappears.

Called "Ostamer," the glue will not be distributed for general use until clinical trials provide sufficient proof of its utility.

Science News Letter, July 11, 1959

### COMMUNICATIONS

## Static-Free Radio To Link NATO Nations

THE DEFENSES of Western Europe's North Atlantic Treaty Organization countries soon will be linked by a 6,500-mile network of static-free, long-distance wireless connections.

The wireless system works by a technique known as "tropo scatter." This is a method by which powerful ultra-high-frequency radio signals are beamed upward over the horizon and then partially deflected downward, beyond the horizon, by the troposphere, the lower layer of the atmosphere.

At each of the 41 stations, which will dot Europe in a line from Turkey to Norway and Great Britain, as many as 132 voice messages can be "scrambled" into a single radio signal. At the next receiving station, which can be up to 250 miles away, a small fraction of the original beam is picked up. It is then unscrambled into the individual voice or teletype messages, or instantaneously re-amplified, and sent on to the next relay station.

The European "tropo scatter" system, known as "Ace High," will be built by Radio Engineering Laboratories, a subsidiary of Dynamics Corporation of America. REL developed the system in 1952.

Besides its value for quick military and defense communication, "tropo scatter" soon may be used for commercial transmission of telephone and teletype communications and even television. Not hampered by the use of wires and cables, "tropo scatter" can leap across impassable jungles and deserts to give reliable communication systems to many of the underdeveloped regions of the world.

Small systems similar to the NATO installation are currently in use in Canada, Libya, and in a Florida-to-Cuba connection.

Science News Letter, July 11, 1959

### AERONAUTICS

## Jet Plane Takes "Swimming Tests"

IN THE SPACE of one minute a huge jet transport will taxi, fly in a storm, descend, and land—all underwater—as part of a six-month safety testing program.

The Convair 440, to be the world's fastest airliner, is being subjected to strenuous underwater tests in a 895,000-gallon water tank to evaluate its structural "integrity." The one-minute cycle of simulated taxiing, flying in a storm, descending, and landing will be repeated 50,000 times, the equivalent of 880 flights.

In addition to its "swimming tests," the jet has undergone laboratory load testing—done with a complicated system of hydraulic rams—and has been subjected to extensive regular flying.

Developed by Convair Division of General Dynamics Corporation, the jet, whose maximum cruise speed is 615 miles per hour, is expected to go into service next year.

Science News Letter, July 11, 1959

## FOREST TECHNOLOGY

# The Changing Face of Wood

Wood is no longer used just as nature made it. New preservation and conservation methods have suggested a variety of uses not explored before.

By ELISABETH MITCHELL

HAVE YOU ever considered what everyday living would be like without nature's most versatile resource, wood?

Throughout the ages man has used this product to live in, to travel in, and even to be buried in. Today approximately 5,000 products come from the forest. The paints and lacquers we use in the home, the film that photographs the children, the rayon that helps clothe us, the cellophane and cellophane tapes that wrap our gifts: these and literally thousands of other items are derived from wood.

The long list of uses is being constantly expanded with the development of better glues and adhesives, better preservatives and fire retardants, and most important of all, greater understanding of the chemical composition of the tree, reports the National Lumber Manufacturers Association, Washington, D. C.

This adaptable resource may even cure some of our ills one day. Scientists at the University of Wisconsin have recently been experimenting with calcium lignin sulfonate, a chemical derivative of wood. It was found to inhibit gastric acid secretion in certain animals. They caution, however, that the chemical has a pronounced blood anticoagulant effect and is somewhat toxic.

The total timber cut in the United States for industry is nearly 204,100,000 tons a year. This does not include bark but only wood substance. Bark would increase the figure by another 20,000,000 tons.

Two main products, lumber and pulpwood, account for 52,000,000 tons and 39,000,000 tons, respectively. Fuelwood and mill residues used for fuel account for the major remaining amount of material. The unused logging and plant residues, which are of interest to the chemical industry as raw materials, amount to 51,000,000 tons.

## Chemical Utilization

Trees contain a large number of chemical compounds and are an excellent potential source of raw material for chemicals. The chemical utilization of the tree has developed in the U. S. into an industry producing at an annual rate in excess of \$111,000,000.

Construction is still the largest single market for wood, and is expanding rapidly with development of new techniques for producing stronger beams and arches, for gluing boards into panels, for gluing chips into boards, and for fastening framing and timbers.

Exciting wood effects are now possible using treated papers combined with plas-

tics to surface low-grade veneers, plywood and lumber. Wood can be processed to resemble a honeycomb structure and then pressed together in layers to form a type of sandwich panel. This sandwich construction combines high strength and stiffness with light weight, and promises to be an important structural material of the future.

There are two main problems connected with the use of wood in construction. The first of these is shrinking and swelling. We are all familiar with sticking doors, windows and drawers.

Oldest and most proven method of curbing shrinking and swelling in wood is the use of paints and other sealers. Further progress along this line is promised by a

water soluble plastic now being developed.

The second major problem is the protection of wood against fire. Wood in massive form has excellent fire resistance because of its strength and its self-insulating qualities. The trend in wood construction, however, is toward thinner panels, sandwich-construction, and lightweight supporting beams. All of these tend to decrease the over-all resistance of the structure to rapid destruction by fire.

## Study Combustion

Chemists are now studying the combustion of wood in laboratories in order to better understand the reactions that take place, and to find more serviceable, fire-retardant treatments. They are also relating the existing action of flame retardants with chemical properties so that improved flame retardants can be made.

About one-sixth of the lumber produced



**WOOD ARCHES**—A workman fastens a shear plate to a wood arch made by gluing layers of wood together. This Florida sports arena has a 242.5-foot wood span, which would have been impossible in the U. S. 25 years ago. Today we have buildings with clear span timber structures of 250 feet and wood towers spanning to 300 feet.

is now being used in packaging. A major weakness of wood containers, however, is the fastening. Although glue is excellent for bonding wood it is not usually a good adhesive for containers. Plastic fasteners and plastic nails have recently been developed and may increase the durability of wood structures and containers which undergo rough handling.

## Pulp: Big Business

The pulp and paper industry alone is now the fifth largest industry in the country and has been one of the most rapidly expanding ones. With a wide variety of pulp grades, strengths, colors and fiber lengths available for blending in many combinations, more new products are constantly being added. By treatment with wax, asphalt, plastic, starch and other materials, better moisture-proof papers are being made, including paper containers for liquids. Paper is being equipped to do more and more jobs which formerly only glass, leather, and cotton could do.

The chemical industry is constantly finding new uses for the spent liquors remaining from the chemical pulp processes. They are used in making adhesives, road binders, tanning agents, plastics, dyes, rosin soap, acetic acid, turpentine, and fertilizers.

Approximately ten percent of the tree substance is the protective sheathing known as bark. With 20,000,000 tons of bark available for processing to some useful commodity instead of using it as a fuel, research on chemical extracts from bark is especially important. Already they are being used for manufacture of glues, plastics, mulch, fertilizers and insulating materials.

As a general pattern, barks consist of lignin fibers, phenolic compounds such as tannins, and other extractives, such as wax. The chemistry of lignin is still much of a mystery, but scientists are experimenting on separating it in a form which can be used in adhesives and plastics or converted to economically stable compounds.

## Research With Carbon 14

Trees have been injected with radioactive carbon to study wood growth, food uptake, and to provide tagged materials for experiment in cellulose chemistry. Wood is around 50% pure cellulose in fiber form, thus trees are the most practical source of this material for industrial use. The results of these experiments have indicated strong possibilities for higher future yields of cellulose per tree plus improved cellulose quality for such large consumers as the rayon, tire, cord, and cellophane industries.

Progressive forestry practices, intelligent tree-farming, careful conservation and scientific research have provided the U. S. with more than adequate supplies of timber to meet all present needs. In fact, an oversupply is foreseen if more new uses and new markets are not found. The lumber industry is facing a sharply increasing competition from plastics, reinforced metals, and the ever-growing aluminum industry. In spite of this, it has been estimated that in the year 2000 the total consumption of timber resources will be more than double that of today's.

Science News Letter, July 11, 1959



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**MISCELLANEOUS**

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# Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AMUSEMENTS IN MATHEMATICS—Henry Ernest Dudeney—Dover, 258 p., illus., paper, \$1.25. Unabridged reprint of 1917 first edition.

ATMOSPHERIC EXPLORATIONS—Henry G. Houghton, Ed.—Wiley & Technology Press, 125 p., illus., \$6.50. Includes chapters on the electrification of clouds and raindrops, electric charges in thunderstorms, upper atmosphere meteorology and phenomena of radio scattering.

THE CAMPUS AND THE STATE—Malcolm Moos and Francis E. Rourke, assisted by Glenn Brooks and Leo Redfern—Johns Hopkins Press, 414 p., \$6. Thorough study of the relationships between state colleges and universities, and American state governments.

## ASTRONOMY For Everyone

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CONSERVING NATURAL RESOURCES: Principles and Practice in a Democracy—Shirley Walter Allen—McGraw, 2nd ed., 370 p., illus., \$6.75. Text revision marks the changes in the conservation movement since 1955.

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY: Hearings, 1959—Jt. Committee on Atomic Energy, U. S. Congress, Clinton P. Anderson, Chmn.—Govt. Print. Off., 630 p., paper, \$1.75. Focus is on civilian atomic power programs and policies.

EVOLUTION OF NERVOUS CONTROL FROM PRIMITIVE ORGANISMS TO MAN: Symposium—Arranged by Bernard B. Brodie and Allan D. Bass, Ed.—Am. Assn. for the Advancement of Science, 231 p., illus., \$5.75. Portrays the impact of the evolutionary process upon the brain.

FUNDAMENTALS OF ORNITHOLOGY—Josselyn Van Tyne and Andrew J. Berger—Wiley, 624 p., illus., \$11.75. Textbook and reference work on families of birds, ornithological terms, bird behavior, song, distribution and migration; chapters followed by references.

HANDBOOK OF JOB FACTS—Guidance Services Dept., S. Dolores Branche, Ed.—Science Res., 2nd ed., 160 p., illus., \$3.95. Vocational information on professional, semiprofessional, clerical, agricultural, skilled and manufacturing occupations.

HERE IS ALASKA—Evelyn Steffansson—Scribner, rev. Statehood ed., 178 p., photographs, \$3.50. Up-to-date information about the people, land, life and developments in the 49th State, beautifully illustrated.

INTRODUCTION TO THE LAKES: An Introduction to the Great Lakes and St. Lawrence Seaway—Frederick Louis Whitlark—Greenwich Bk., 256 p., illus., \$3.95. A ship's surgeon tells of life, commerce, boats and installations on the Great Lakes.

LABORATORY MANUAL TO ACCOMPANY MOMENT'S GENERAL ZOOLOGY—H. Bentley Glass, Gairdner B. Moment and Neal A. Weber—Houghton, 293 p., illus., paper, \$3.75.

LOCOMOTIVES AND CARS SINCE 1900—Walter A. Lucas, Compiler & Ed.—Simmons-Boardman, 119 p., \$5. Pictorial survey of steam locomotives, electric, diesel and freight cars, designed so the model builder can construct his own scale models.

MATERIALS FOR NUCLEAR REACTORS—Bernard Kopland, Ed.—McGraw, 411 p., illus., \$12. Comprehensive treatment of the atomic fuel cycle, and of the properties and behavior of important materials in reactors.

MECHANICAL MAN—Beril Becker—Putnam, 192 p., illus. by Gyula Zalzer, \$2.95. Traces the pattern of mechanical progress from Da Vinci, through the steam engine, early factories, the telegraph, the electric light, mass production, to the mechanical brain. For young readers.

NATURAL RESOURCES—Martin R. Huberty and Warren L. Flock, Eds.—McGraw, 556 p., illus., \$11. Series of lectures on recent developments in our renewable and nonrenewable resources, including topics such as air pollution control, photosynthesis, geophysical prospecting and fresh water from saline.

THE NEW PSYCHIATRY—Nathan Masor—Philosophical Lib., 155 p., \$3.75. Critique of "orthodox psychiatry" with its reliance on the couch, in favor of biochemical and endocrinological approaches to mental health.

OLD CLOCKS—H. Alan Lloyd—Benn (Essential Bks.), rev. ed., 176 p., illus., \$7.50. Describes British and Continental early clocks, mantel and long-case clocks, dials, night clocks and American clocks.

THE ORIGIN OF SPECIES BY CHARLES DARWIN: A Variorum Text—Morse Peckham, Ed.—Univ. of Pa. Press, 816 p., \$15. Includes all major additions, deletions and changes in style Darwin made as he wrote this definite work, re-writing many of his sentences four or five times.

PRINCIPLE OF RADIATION DOSIMETRY—G. N. Whyte—Wiley, 124 p., illus., \$7. Deals with the measurement of X-rays, gamma rays, charged particles and neutrons. Discusses new definitions specifying exposure dose and absorbed dose, as set forth by the International Commission on Radiological Units in 1956.

THE ROAD TO MAN—Herbert Wendt, transl. by Helen Sebba—Doubleday, 431 p., 200 photographs, \$5.95. Informal history of evolution, taking a trip through the animal kingdom, selecting characteristic examples. The Swiss author calls it a "kind of novel of the animal world."

STEREO: How It Works—Herman Burstein—Gernsback, 224 p., illus., \$5, paper \$2.90. Explains theory, operation, recording techniques, multiplexing, discs, tapes and other aspects of stereo.

STUDIES IN INVERTEBRATE MORPHOLOGY—Ernestine B. Thurman and others, J. F. Gates Clarke, Chmn.—Smithsonian Inst., 416 p., illus., \$7.50. Original contributions published in honor of Dr. Robert Evans Snodgrass, on the occasion of his 84th birthday.

A SYMPOSIUM ON MOLECULAR BIOLOGY—Raymond E. Zirkle, Ed.—Univ. of Chicago Press, 348 p., illus., \$7.50. Twenty papers on molecular research, showing the diversity of problems and of methods used in attacking them.

TARGET FOR TOMORROW: Space Travel of the (continued on p. 30)

# How to Be Incredibly Cool This Summer

Arthur Carson's *How to Keep Cool* describes practically every fast, low cost, scientifically right way known so you can cool off fast, and stay cool all summer long. With this book to guide you, there's simply no excuse any longer for sleepless nights or nerve-wrecked days when you just can't bear the heat any longer. Whole sections of this 50,000 word book tell you how to get the benefits of air conditioning without all the cost. Now, for perhaps the first time in your life, you learn the scientific ways to cool a single room or an entire house with low cost electric fans. (From now on, forget your old belief that fans are good only to chill you and give you a bad cold and a stiff neck.) There's full information on the many easy, inexpensive, practical things you can do inside and outside your home to bring sea breeze comfort without drafts. How a \$15 job in your insulation-less attic can change your bedroom from an oven to

an airy, comfortable place on the hottest nights. Why Venetian blinds offer little practical protection from the heat and what is much, much cooler. You learn how to get the last bit of use out of attic fans, dehumidifiers, the new low cost evaporative coolers (much less expensive than air conditioners and better if you live in the right part of the U. S. for their use), the different kinds of air conditioners, and how to make a low cost installation do the job of a more expensive one.

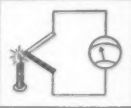
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This summer, be cool on the hottest days. *How to Keep Cool* costs only \$1—how small a sum that is on a day when you'd give anything to get cool. So order it now.

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**LIQUIDS AND GASES** by Alex. Efron, E.E., Ph.D. While primarily concerned with the "why" of the subject, this probing analysis includes discussion of the practical applications of the theory. The text covers such aspects as the behavior of liquids and gases, pressures in fluids, Archimedes' principle, relative density, etc. #200-6, \$2.10.

**NUCLEAR ENERGY** by Alex. Efron, E.E., Ph.D. The atom, its makeup and uses are completely explained. Starting with the history: the electron, proton and neutron; natural radioactivity, alpha, beta and gamma rays, detectors, isotopes, the book progresses to advanced concepts such as the mass-energy relationship, induced radioactivity, nuclear fission, hydrogen bomb, etc. #200-7, \$1.25.

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## Books of the Week

(continued from p. 28)

**Future**—I. M. Levitt—Fleet Pub., 328 p., illus., \$4.95. The director of the Fels Planetarium of the Franklin Institute takes his readers into the world of interplanetary travel. Scientific facts in nontechnical language.

**TUBERCULOSIS MEDICAL RESEARCH: National Tuberculosis Association 1904-1955**—Virginia Cameron and Esmond R. Long—Nat. Tuberculosis Assn. 325 p., \$5. Story of pioneer medical research program, traced from its small beginnings to today's well-rounded program, includes 51-page bibliography.

**USING CHEMISTRY**—Oscar E. Lanford—McGraw, rev. ed., 738 p., illus., \$5.48. Introductory chemistry course, emphasizing basic principles, with extensive section on organic chemistry brought up to date.

**WATER FACTS FOR THE NATION'S FUTURE: Uses and Benefits of Hydrologic Data Programs**—Walter B. Langbein and William G. Hoyt—Ronald Press, 288 p., \$5. Sponsored by the Conservation Foundation, this is a survey of the achievements and shortcomings of federal and state programs for collecting, interpreting and publication of water data.

Science News Letter, July 11, 1959

## Questions

**ASTRONOMY**—Where will the world's second largest telescope be located? p. 23.

**GENETICS**—What plant produced genes that appear to defy known genetic laws? p. 20.

**PUBLIC HEALTH**—How many persons now using central water supplies in the United States drink fluoridated water? p. 21.

Photographs: Cover, Lick Observatory; p. 19, Boeing Airplane Company; p. 21, Avion Division, ACF Industries; p. 23, Lederle Laboratories; p. 26, National Lumber Manufacturers Association; p. 32, Stanley Electric Tools.

## Do You Know

During 1958, the largest iron-ore-producing states were Minnesota, Michigan and Alabama, in that order.

A very hard rock called taconite, containing about 25% iron, is found abundantly in the Lake Superior region.

In 1958, out of every 14 Japanese students, nine were studying science and only five literature, as compared to 1957 when the proportion was reversed.

Dried sapodilla latex, or *chicle*, was first brought to Staten Island by the deposed dictator of Mexico, Santa Anna, with the hope of producing rubber.

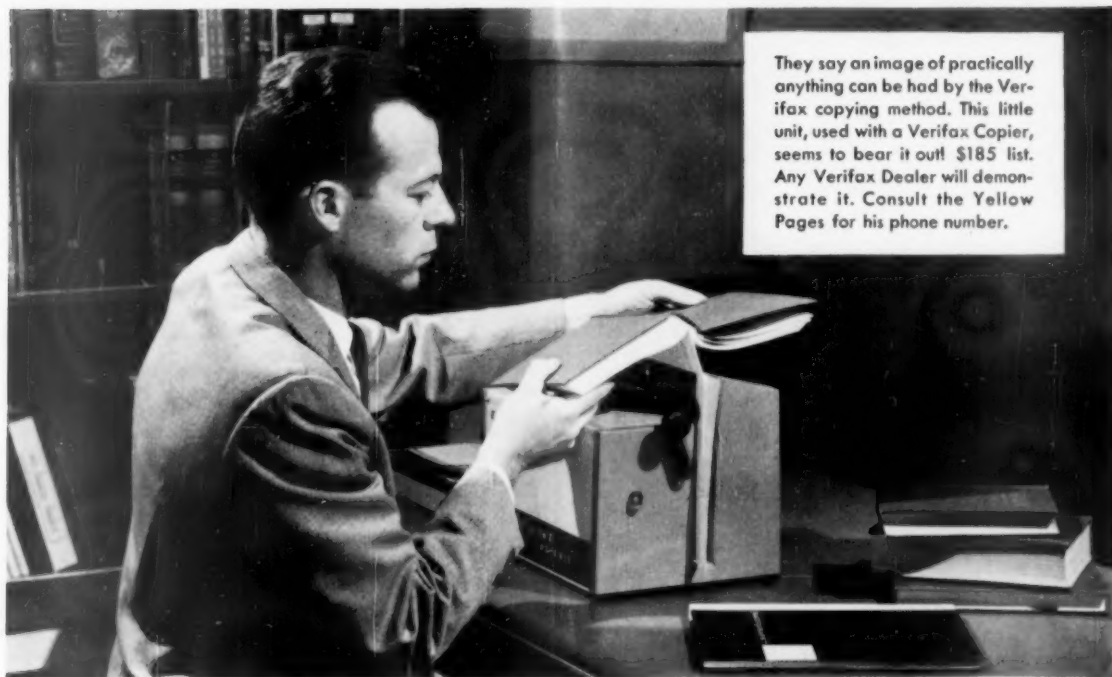
If two billion of the world's population worked at full rate, their total yearly output would be equivalent to the energy in about 43,000,000 tons of coal.

## Best Book Contest for 1959

\$1600 Cash Awards plus 40% return. All types of manuscripts invited. For Contest rules and details of famous publishing plan, write for free Brochure SN. Pageant Press, 101 Fifth Ave., N. Y. 3

## Kodak reports on:

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They say an image of practically anything can be had by the Verifax copying method. This little unit, used with a Verifax Copier, seems to bear it out! \$185 list. Any Verifax Dealer will demonstrate it. Consult the Yellow Pages for his phone number.

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1. Into a liquid triglyceride such as cottonseed oil put a small percentage of monoglyceride made from any saturated fat.



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3. The oil becomes a stiff solid. The crystalline matrix holds the oil for prolonged periods with practically no leakage.

*This works only with exceptionally pure monoglycerides such as we make by molecular distillation in carload quantities. To find out more, write Distillation Products Industries, Rochester 3, N. Y. (Division of Eastman Kodak Company).*

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Complexity, complexity! Rest the mind on a simple product, a photographic-emulsion-bearing rectangle 6.0 millimeters thick, 190 millimeters wide, 215 millimeters long, and flat within 0.00002-inch per inch. We mean: **Nowhere on the surface bearing the emulsion will it be possible to draw a circle of one-inch diameter containing a point of the surface more than 0.00002-inch distant from the plane of the circle.** Though achievement of such flatness is not simple, that is none of the user's business.

The user's business is to know the path of a man-made object moving across the sky and to know it with the best precision that man can currently master for the task. The work requires dimensional constancy of the material which bears the image.

That material is glass, a substance known to the Phoenicians and since improved. Our kind alters its linear dimensions by 0.00045% for each degree Fahrenheit of temperature change. Polyester, the most dimensionally stable of commercially available plastics, is called "stabilized" when its temperature coefficient is brought down to twice that. For the hardened steel from which gage blocks are made, the linear expansion coefficient is down to 0.00056%. Steel is opaque and does wicked things to sensitive emulsions.

George Eastman quit his job as a bank clerk in 1881 when he found he could coat emulsion on glass and sell it. That's how our whole business started. Don't think of the photographic plate as an antique, however. To find out how wrong that would be, try putting a question to Eastman Kodak Company, Special Sensitized Products Division, Rochester 4, N. Y. For one thing, you could ask about those ballistic camera plates announced above.

Price is subject to change without notice.

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**This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science**

# New Machines and Gadgets

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE NEWS LETTER, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 995. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

**FOG HORN** for small craft is trigger-operated and self-powered by a liquefied gas. It is hand-size and has been approved under U.S. Coast Guard regulations for small boats. The horn will emit a blast rated at 110-115 decibels and can be heard at least 1,000 feet away in the densest fog and one mile away on a clear day.

Science News Letter, July 11, 1959

**WHEEL BLOCKS** keep cars from rolling from the beach or ramp when unloading or launching a boat from car or trailer. The blocks, which measure six-by-four-by-eight inches, are also recommended for use with private airplanes and for emergency road use.

Science News Letter, July 11, 1959

**STRUCTURAL STEEL KITS** designed for do-it-yourselfers can be used to make anything from ladders and tables to a utility trailer. The kits contain 100 feet of steel members punched with holes so that they may be cut up and bolted together to comply with any specifications. All necessary nuts and bolts are included.

Science News Letter, July 11, 1959

**ELECTRIC GRASS TRIMMER**, shown in the photograph, for cutting grass along walks, walls, fences and garden edges elim-



inates the need for hand trimming. It has an adjustable handle, a protective cutter guard to keep stones and dirt from hitting the operator, and a blade mounting that absorbs vibration.

Science News Letter, July 11, 1959

**BOAT VARNISH** can be applied in damp weather and is said to retain its original luster despite exposure to salt water

and severe weather conditions. The varnish dries to touch in one hour and can be sanded and recoated within four hours. It may be used on the boat's decks, spars, cabin furniture and interior woodwork.

Science News Letter, July 11, 1959

**GARAGE DOOR** of glass fiber is one-third the weight of wooden garage doors and admits light much the same as frosted glass. The door, which has extruded aluminum frames, is said to be weather-resistant, shutterproof, and warp-proof. It is available in ten sizes and comes in several colors.

Science News Letter, July 11, 1959

**WIND-UP SHAVER** works entirely by spring action. No batteries or electric wires are necessary. Recommended for campers, it is self-sharpening and is said never to nick. Two interchangeable heads, one for short and one for long hairs, are supplied. The shaver has rotary blade motion and is encased in unbreakable plastic.

Science News Letter, July 11, 1959

**MUSICAL CIGARETTE LIGHTER** begins to play music when it is ignited, and keeps playing while lighted. The music stops when the igniter is released and the flame extinguished.

Science News Letter, July 11, 1959



## Nature Ramblings



### By HORACE LOFTIN

REPORTS FROM all over the country indicate several species of song birds are at an all-time low in numbers. This is due to extreme weather conditions, use of insecticides and other harmful factors. But if there are fewer birds, the same can hardly be said for the bird-watching enthusiasts across the nation.

For example, take a look at the number of observers taking part in the annual Christmas Bird Count. Sponsored by the National Audubon Society, this midwinter bird census is held throughout the U.S. and Canada every Yuletide season.

In 1900, when Frank M. Chapman started the first counts, there were 25 areas reporting and 27 participants in all. By 1929, 500 bird watchers covered 205 census areas. Then the phenomenal growth really started. Ten years later, 1939, there were 1,900 participants, then 4,615 in 1949. Finally 7,477 eager census takers participated in the last midwinter bird count, covering 572 areas from Key West to Coho, Alaska.

### A Sporting Proposition



On the basis of these figures, it can be said that the Christmas Bird Count is a very large organized outdoor sporting event and, considering the number of active participants, possibly the largest in the nation. Of course, the midwinter census-takers represent only a portion of the active bird watchers in the nation.

What is it all about? What is the fascination of this hobby-sport? You get a clue when you consider the states that have the greatest number of areas reporting each year: New York with 41, Ohio with 36, Pennsylvania with 31. These are regions

with many large cities and beautiful countryside to escape into. The first attraction of bird-watching to many people, then, is an "excuse" for heading for the wide open spaces, away from concrete and neon into green fields and sunlight.

Then there is the element of skill: you have to be good to be a competent bird watcher, since you must learn to identify by sight all the birds of your region, in fall and winter plumage. In many cases you must learn to identify them by their songs, too. And after you have mastered the 200 to 400 species of your own area, you strike out for new country and new birds to learn.

Then the element of competition, a healthy one, is added to this exciting sport. You want to crack your own record, or strive for the top number of birds for your count area over a "competing" area of your state.

And finally, there is the satisfaction of learning and knowing that you are adding to the understanding of the natural world as you help uncover the habits of bird life.

Science News Letter, July 11, 1959



